



NOTES FILAMENTS

GENERALLY, WHAT ARE THEY?

PATHOLOGY & CAUSES

- Gram $\oplus$ slender bacteria with $\oplus$ branches (atypical lung disease organisms, capable of affecting any body organ)
- Atypical organisms $\rightarrow$ indolent disease $\rightarrow$ insidious growth $\rightarrow$ severe disease

RISK FACTORS

- Immunodeficiency
- Corticosteroid use $\rightarrow$ iatrogenic immunosuppression

SIGNS & SYMPTOMS

- Cough, dyspnea
 - Indolent course
 - Common in fever's absence
- Other symptoms
 - Dependent on organ systems affected by organism

DIAGNOSIS

DIAGNOSTIC IMAGING

Chest X-ray

- Localized alveolar infiltrate
 - Homogeneous, non-segmental, cavitary appearance

LAB RESULTS

- Tissue biopsy $\rightarrow$ histological

OTHER DIAGNOSTICS

Physical examination

- Pulmonary examination
 - **Auscultation:** rhonchi (crackles), $\downarrow$ breath sounds
 - **Palpation:** $\downarrow$ tactile fremitus
 - Percussive dullness

TREATMENT

MEDICATIONS

- Antibiotics

SURGERY

- Resection
 - Medication non-responsive
 - Large infections $\rightarrow$ significant dysfunction

VISIT...

LANZAROTE
Caliente.COM

ACTINOMYCES ISRAELII

osms.it/actinomyces-israelii

PATHOLOGY & CAUSES

Microbe characteristics

- ⊕ Gram stain
- Shape
 - Filamentous, non-spore-forming, pleomorphic bacilli
- Metabolism
 - Catalase negative, anaerobic/microanaerobic bacilli
- Types
 - 21 species found in humans
 - *Actinomyces israelii* most common
- Locations
 - Normal mouth (by two years old), gastrointestinal (GI) tract, female genitourinary tract flora

PATHOLOGY

- Uncommon infection source
- Mucosal membrane violated → indolent, invasive disease
 - Commonly co-occurs with another pathogen → micro-O₂ *Actinomyces* environment
 - Can burrow through soft tissue, bone → small abscesses, drainage tracts
 - Abscesses: yellow sulfur-containing granules in granulomatous reactive material setting (bacteria found in microfilament tangles, surrounded by neutrophils)

TYPES

Cervicofacial

- Osteomyelitis of mandible/maxilla
 - Resident flora in periodontal pockets, carious teeth, dental plaque, tonsillar crypts

Thoracic

- Pulmonary → pneumonia
 - Oropharyngeal content aspiration → bacterial alveoli seeding → immune response, bacterial growth → pneumonia

Abdominal & pelvic

- Gastrointestinal → appendicitis
 - Preceding colonic mucosa perforation → unrecognized → months-year course → symptomatic infection
- Pelvic → female genitourinary infections
 - Complicated abortions, infected intrauterine devices (IUDs), endometritis, tubo-ovarian abscess (TOA)

RISK FACTORS

- Chronic granulomatous disease

Cervicofacial

- Chronic tonsillitis, dental decay, periodontal disease, mastoiditis, otitis media

Thoracic

- Aspiration history

COMPLICATIONS

Cervicofacial

- Deep neck tissue infection → retropharyngeal space → mediastinitis
- Meningitis → if sinus tracts to posterior neck, spinal cord

Thoracic

- Pneumonitis

Abdominal & pelvic

- Gastrointestinal
 - Peritoneal, hepatic, pelvic infectious spread

SIGNS & SYMPTOMS

Cervicofacial

- Lumpy jaw
 - Usually in fever's/other infectious signs' absence
- Progression → oral mucosa, trismus sinus tract draining

Thoracic

- Fever, cough > three day duration
- Auscultation
 - Rhonchi
 - ↓ breath sounds
- Palpation
 - ↓ tactile fremitus
- Percussive dullness

Abdominal & pelvic

- Gastrointestinal → appendicitis
 - Asymptomatic colonic mucosa (micro) perforation → months–years prodrome → symptomatic appendicitis
 - **Nonspecific prodrome:** chronic fever, weight loss, diarrhea, constipation, night sweats
 - **Appendicitis:** nausea, vomiting, anorexia
- Pelvic → female genitourinary infections
 - Painful abdominal, cervical examination
 - Purulent vaginal discharge

DIAGNOSIS

DIAGNOSTIC IMAGING

Chest X-ray

- Thoracic
 - **Localized alveolar infiltrate:** homogeneous; non-segmental, cavitory appearance; can extend past fissure lines → into chest wall

Barium enema

- Abdominal, pelvic
 - Luminal narrowing, fistualization, extrinsic compression

CT scan

- Abdominal, pelvic
 - Disrupted tissue planes

Colonoscopy

- Abdominal, pelvic
 - Normal/thickened mucosal appearance, colitis, ulceration, nodular lesion, button-like appendiceal orifice elevation

Bedside ultrasound

- Abdominal, pelvic
 - TOA evaluation

LAB RESULTS

- Cervicofacial
 - Monoclonal antibody staining
 - Polymerase chain reaction (PCR) of 16S rRNA

Cultures (needle aspiration)

- Cervicofacial
 - **Histology:** granulation tissues with neutrophils, foamy macrophages, lymphocytes, plasma cells (with surrounding fibrosis)
- Abdominal, pelvic
 - **Histology:** granulation tissue surrounding oval, eosinophilic zones

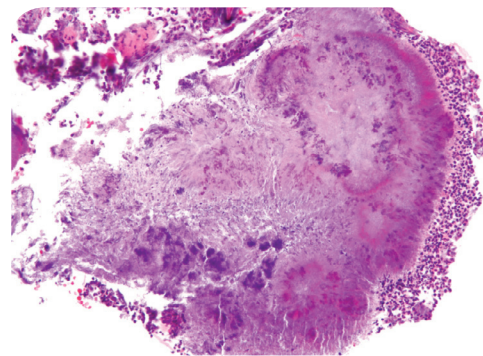


Figure 71.1 Sulphur granules formed by *Actinomyces* organisms.

OTHER DIAGNOSTICS

History

- Thoracic
 - May have community-acquired pneumonia diagnosis, treatment (without relief within 3–5 days)

Physical examination

- Cervicofacial
 - Lymphatic examination
- Thoracic
 - Pulmonary examination

TREATMENT

MEDICATIONS

- Antibiotics
 - Prolonged (weeks–months) penicillin V (oral)/penicillin G (intravenous)
 - Amoxicillin (alternative)

SURGERY

- Necrotic disease/especially large abscess formation cases

NOCARDIA

osms.it/nocardia

PATHOLOGY & CAUSES

- Microbe characteristics
- ⊕ Gram stain
- Shape
 - Filamentous, branch-forming, bacillus
 - Branches → beaded appearance (delicate nature of stain → cocci/bacilli fragmentation)
- Metabolism
 - Aerobic, catalase ⊕, urease ⊕
- Types
 - > 80 species
 - Around 30 disease-causing in humans
- Locations
 - Saprophyte (organic pathogen) → found in soil, house dust, water (fresh/salt), bathing pools

PATHOLOGY

- Direct tissue inoculation
 - Saprophyte → aerosolization common (↑ ↑ pulmonary infections)
 - Soil/water contamination (contaminated food → GI disease, skin trauma → cutaneous disease, eye trauma → ocular disease)

- Facultative intracellular organism → requires innate host defense mechanisms
 - **Inhalation entry:** deficient/ineffective mucociliary clearance, host response → bronchopulmonary disease
 - **Skin trauma entry:** deficient keratinized skin barrier → local subcutaneous infection; deficient keratinized cornea → ocular infection
- Rapid filamentous growth → ↓ phagocytic clearing
 - Phagocytosed → ↓ lysosomal destruction (phagocyte-lysosome fusion inhibition; catalase, dismutase production → ↓ reactive oxygen species → pathogen survival)

TYPES

Pneumonia

- *Nocardia asteroides* (common pathogen)
- > 2/3 of total disease
- Progression
 - Empyema, pericardial effusion

Primary cutaneous infections

- *Nocardia brasiliensis* (common pathogen)
- Cellulitis, ulcers, pyoderma, mycetoma

- Progression
 - Abscess/nodular development, lymphangitis

RISK FACTORS

- ↓ mucociliary clearance
 - Cystic fibrosis, asthma, bronchiectasis
- Immunosuppression
 - Iatrogenic (most commonly corticosteroid use); lymphoreticular malignancy; chronic obstructive pulmonary disease; chronic granulomatous disease; dysgammaglobulinemia; HIV infection; bone marrow, organ transplant

COMPLICATIONS

- Organ dissemination
 - Pulmonary infection → hematogenous spread (commonly)
 - **Most common:** central nervous system (meningitis, cerebral abscess)
- Pulmonary
 - Empyema, pericardial effusion
- Cutaneous
 - Lymphangitis
- Ocular
 - Endophthalmitis (ocular infection)

SIGNS & SYMPTOMS

Pneumonia

- Acute, subacute, chronic suppurative course
 - Symptoms may also relapse/remit
- Cough, dyspnea common
 - Anorexia, weight-loss (uncommon)
 - Hemoptysis (cavitary disease)
- Rhonchi (crackles)
- ↓ breath sounds, tactile fremitus, +/- egophony

Local cutaneous infection

- Local erythema, warmth, +/- ulceration, nodular growth

Neurologic infection

- Meningismus, fever, rigors, seizure

DIAGNOSIS

DIAGNOSTIC IMAGING

Chest X-ray

- Pulmonary
 - Homogeneous, non-segmental, cavitary alveolar infiltrate

Brain MRI

- Neurologic
 - ↑ T1 imaging intensity → ↑ enhancement (gadolinium)

LAB RESULTS

- Tissue biopsy: histology (acid fast stain)
 - Gram ⊕, branching, beaded filamentous growth

TREATMENT

MEDICATIONS

Antibiotic monotherapy

- Mild/moderate disease
- 3–6 months treatment duration
- Sulfonamides → trimethoprim-sulfamethoxazole (TMP-SMX)
- Linezolid
 - Nocardia 100% sensitive
 - Limited treatment duration (2–3 weeks) → ineffective monotherapy for complete therapy duration

Antibiotic multi-agent therapy

- Severe disease
- Up to 6–12 months treatment duration
- Agents
 - TMP-SMX + amikacin/carbapenem/linezolid
- Commonly for progressive disease in immunosuppressed individuals/pulmonary, disseminated disease

Prevention & vaccine

- Daily, full-strength TMP-SMX → secondary prophylaxis
- *P. jirovecii* TMP-SMX prophylaxis (3x/week) → ineffective

SURGERY

- Indicated for
 - Antibiotic-resistant, large cutaneous/cerebral abscess (craniotomy/aspiration effective)
 - Empyemas, large fluid collections
 - Pulmonary nocardiosis → pericarditis (fatal if not performed)